Harlan Project Proposal

Goosenest Ranger District, Klamath National Forest

Background

The Goosenest Ranger District of the Klamath National Forest proposes the Harlan Project to improve forest health and diversity, improve opportunities for the safe management of wildfire while promoting beneficial effects of fire, maintain historic grassland and shrubland habitats, improve foraging habitat for elk and deer, protect cultural resources, and provide for safe public access to open roads. The Forest Service proposes to treat up to 19,000 acres within the 22,925 acre project boundary.

The project is located within the Horsethief Creek, Lough Lake, Lower Butte Creek, Prather Creek, and Upper Butte Creek 6th field watersheds. The project is directly west and north of the community of Bray, California, and is approximately eight miles south of Macdoel, California in Siskiyou County: Township 44 North, Range 1 West, Sections 2-10, 15-21; Township 45 North, Range 1 West, Sections 15, 17, 20-23, 26-30, 32-35; Township 44 North, Range 2 West, Sections 1-3, 10-14, 23; Township 45 North, Range 2 West, Sections 8, 9, 15, 16, 22-27, 34, 35, Mount Diablo Meridian. Vicinity and project maps are attached (Appendix B). Elevation ranges from 4,200 to 5,300 feet in the project area.

The majority of the ponderosa pine stands in the Harlan project area were railroad-logged during the 1920s and 1930s (Shoup, 1981). This practice removed almost all of the large-diameter mature ponderosa pine from the project area. Most of these railroad-logged stands were managed by thinning one or more times since the railroad-logging era. The last thinning treatment of these stands took place approximately 25 years ago. Thinning is needed to reduce the risk of severe wildfire effects, promote forest health, and prevent stand health issues, such as insect infestation and disease that will occur in overly dense pine forests.

Approximately 25 years ago, some areas that had not naturally reforested after railroad-logging were planted with ponderosa pine. Currently, these plantations have more trees than the growing sites can support. This condition has reduced stand resilience and led to greater susceptibiliy to the effects of drought, insect attack, disease, and wildfire. Thinning is needed to improve stand health.

Before European settlement, fire played a major role in shaping the vegetation communities in the Harlan project. Historic fire return intervals in the area were as frequent as 6-17 years in the ponderosa pine stands (Sugihara, 2006) and increased to 11-25 years in areas where vegetation transitions to sagebrush (Miller, 2001). While there have been many historic disturbances within the project area, including logging, Forest Service records indicate most of the project has not had landscape level natural fire since at least the 1940s. The majority of the project area has missed at least four low-intensity fires, based on the averaged fire return interval for the project area. This situation is consistent with the overall estimated departure from normal fire return in the south Cascades (Safford, 2014). Historic fires generally exhibited low flame lengths, did not kill large numbers of trees, and did not result in severe fire effects to soils and vegetation.

Because fire has not been allowed to play its normal historic role, fuel loading within the project area is much higher than would be expected from the historic ecosystem. This increases the risk of large, stand-replacing wildfires and severe fire effects. The 2009 Tennant Fire and 2014 Little Deer Fire both occurred within very similar ponderosa pine plant associations (Smith, 1994), with a similar management history, a similar departure from natural burn cycle, and in the same geographic area as the proposed Harlan Project. Both fires killed large numbers of trees and burned intensely, resulting in severe fire effects to vegetation and soils. The exclusion of natural fire from the Harlan project is also evidenced by the ongoing process of juniper encroachment into shrub-steppe and shrub-steppe/forest transitional habitats. Shrub-steppe habitats are characterized by low amounts of precipitation that arrives mostly as snow, cold winters, and vegetation communities that are dominated by grasses, herbaceous plants, and shrubs.

Comparison of 1944 aerial photos of the project area with current satellite imagery clearly indicates that western juniper encroachment has been an ongoing process and is consistent with the pattern of encroachment that has taken place across the western United States. A natural wet period, which occurred in the late 1800s through the early 1900s (Earle, 1986), is thought to have favored germination of juniper seed and establishment of young trees. This, combined with a substantial reduction of wildfire events following European settlement (Miller, 1999; Burkhardt, 1976), is thought to be the principal cause of rapid juniper expansion, primarily into shrub-steppe habitats (Miller, 1999; Burkhardt, 1976) across the western US and on the Goosenest Ranger District. The most recent expansion of juniper is greater than any other that has taken place within the last 6,000 years (Miller, 1994).

Management Direction

Direction for this project comes from the Klamath National Forest Land and Resource Management Plan (Forest Plan) of 1995, as amended. Other laws, regulations, and policies that provide management guidance or direction for this project include, but are not limited to, the National Fire Plan, the Forest Fire Management Plan, the Endangered Species Act, the National Historic Preservation Act, the Clean Water Act, and the Clean Air Act. The project is designed to be consistent with all applicable laws, regulations, and policies.

The Forest Plan's direction and guidance specific to management areas (MA) found within the project area are described in table 1 below and Appendix B (attached map). For further information pertaining to the Forest Plan, please visit the Klamath National Forest public website(http://www.fs.usda.gov/main/klamath/landmanagement/planning).

Table 1. Management Areas found within the project boundary.

Management Area	Pages in Forest Plan	Approximate Acres
Winter Range (MA-14)	4-123 to 4-125	12,951
Partial Retention Visual Quality Objective (MA-15)	4-126 to 4-127	2,702
Riparian Reserves (MA-10)	4-106 to 4-114	2,399

Management Area	Pages in Forest Plan	Approximate Acres
Forage (MA-16)	4-128 to 4-130	2,212
Retention Visual Quality Objective (MA-11)	4-115 to 4-116	1,692
Special Habitat (MA-5)	4-82 to 4-94	501
General Forest (MA-17)	4-131 to 4-132	9
Goosenest Adaptive Management Area	4-133 to 4-137	11,330

Other features to consider within the project boundary include one bald eagle nest, one northern goshawk nest, and bald eagle winter roosting habitat.

Existing and Desired Condition

A comparison between the existing and desired conditions within the Harlan Project boundary helped develop the purpose and need for the project, as shown in table 2 below.

Table 2. Existing and Desired Condition

Existing Condition	Desired Condition	Purpose and Need
Successful suppression efforts over the past century have excluded fire from the project area. This has contributed to heavy fuel loadings, high stand densities, continuous fuel conditions, allowed encroachment of fire intolerant species, and has displaced historic fire-influenced vegetation communities. The lack of fire has increased the likelihood of large, high severity fire impacting the landscape.	A resilient landscape capable of withstanding periodic low severity fires that more closely resemble the historic fire regimes of the pre-settlement vegetation types. Vegetation community and structure is consistent with the historic (pre or early European settlement era) fire adapted community. "Restore fire to its natural role in the ecosystem, to the maximum extent possible, consistent with the safety of persons, property and other resources" (Forest Plan, S&G 22-1).	Restore beneficial fire effects to fire adapted ecosystems.
Dense, even-aged stands of mixed conifer have increased the occurrence of disease and insect damage. Exposure to extended drought has further reduced tree resilience to insects and disease.	Timber stands resemble historic stocking levels with variability in age and structure. "Avoid conditions that promote the introduction and spread of disease, increase the risk of insect attack, or promote	Improve forest resilience to wildfire, insects, and disease.

Existing Condition	Desired Condition	Purpose and Need
	unacceptable fire risk" (Forest Plan, S&G 21-58).	
No commercial timber product is being produced from treatment areas proposed by the Harlan project. Sustainable opportunities for firewood cutting are reduced due to limited access for vehicles.	Timber and biomass will be produced, and the public will have increased opportunity to gather firewood. Vehicle access to sustainable firewood gathering is temporarily available. "Manage for a programmed, sustained harvest of wood products where appropriate and consistent with wildlife habitat goals" (Forest Plan, p. 4-128).	Provide socio-economic opportunities to the public, including timber products and firewood.
Bald eagle winter roosting habitat is being encroached by white fir and western juniper. These fire intolerant species create ladder fuels that threaten historic roost trees.	"Prescribed fire will be used to maintain or improve bald eagle habitat" (Forest Plan, p. 4-92). "Eastside winter roost areas: These areas are stands of mature conifers, primarily ponderosa pine. Large snags and live conifers with open crowns and stout lateral limbs for perching are common. The vegetative features of the stands provide for protection from weather" (Forest Plan, p. 4-90).	Maintain and improve the quality of the bald eagle winter roosting habitat.
Browse species such as antelope bitterbrush, big sagebrush, and curlleaf mahogany lack a diversity of age classes and individual plants are generally over-mature. This limits the ability of these shrubs to produce vigorous shoot development that is preferred by browsing animals. Perennial native grasses and forbs have been removed or are not in a healthy condition where fire suppression has allowed juniper encroachment, dense shrub-development, or dense stands of trees to compete with	Uneven age and structure of browse species across the project area. Native grasses and forbs are well represented and healthy in suitable habitats. Cheatgrass and other invasive annual plants play a subdominant role in the ecosystem or are not present.	Improve the diversity and quality of forage species for big game and other wildlife species across the landscape.

Existing Condition	Desired Condition	Purpose and Need
grasses and forbs for soil resources and light.		
The community of Bray, a portion of US Highway 97, and numerous recreational sites are located within the project boundary. Heavy fuel loads and continuous fuel conditions increase the potential of fire threatening these resources. Wildfire suppression operations along the roads where strategic fuel breaks will be constructed (see project activity map) may not be feasible or successful due to safety concerns because of high fuel loads and associated potential for intense fire behavior at these locations.	Light fuel loads exist within strategic fuel breaks located adjacent to identified roads. Predicted fire intensity and severity within the fuel break is acceptable, and the potential for fire to cross the existing roads is low. Wildfire suppression can be safely and effectively conducted in treated areas.	Enhance opportunities to protect communities and the public from wildfire.
Potential for impacts to cultural resources from vehicle impacts.	Cultural resources are permanently protected from motor vehicle damage.	Protect cultural resources in the vicinity of Dead Steer Flat.
Safety hazard and potential for continued degradation and erosion on road # 44N03Y, which is open to public travel.	Road # 44N03Y is stabilized against continued degradation and erosion and is safe for public travel.	Provide for safe public access, consistent with the Forest Motor Vehicle Use Policy, on designated routes within the project area.

Purpose and Need

After comparing the existing and desired conditions, the Forest determined there are needs to:

- Restore beneficial fire effects to fire adapted ecosystems.
- Maintain healthy forests that are resilient to wildfire, drought, and insects and disease on the landscape.
- Provide a supply of sustainable forest products, including firewood.
- Maintain and improve the quality of the bald eagle winter roosting habitat.
- Improve the diversity and quality of forage species for big game and other wildlife species across the landscape.
- Enhance opportunities to protect communities and the public from wildfire.
- Protect cultural resources in the vicinity of Dead Steer Flat.
- Provide for safe public access, consistent with the Forest Motor Vehicle Use Policy, on designated routes within the project area.

Proposed Action

The proposed action was designed to meet the purpose and need of the project. The proposed action will treat up to 19,000 acres within the 22,925 acre project boundary. Multiple treatments may overlap in order to achieve project goals and objectives in a stand. Locations of treatments, including overlapping treatments, are displayed on the proposed treatment map (Appendix B). Treatment acreages are approximate and may be adjusted and refined following scoping.

This project includes the following six treatments, some of which overlap: (1) prescribed fire, (2) thin from below, (3) plantation thin, (4) juniper reduction, (5) commercial biomass, and (6) strategic fuel breaks. Map(s) of the proposed treatments are found in Appendix B.

1. Prescribed Fire

Prescribed fire will include understory burning using hand or aerial ignition sources. The intent of prescribed fire is to restore beneficial effects of fire to fire-adapted ecosystems by reducing heavy fuel buildup, impeding the encroachment of fire intolerant species, and creating a mosaic of burned and unburned fuels across the project area.

Site-specific burn plans will be written prior to the use of prescribed fire. These plans will incorporate specific fuel reduction and silvicultural objectives, as well as project design features to protect specific resources.

Prescribed fire may be used as a stand-alone treatment, or in combination with other treatments. Prescribed fire treatments will be conducted during appropriate seasons and conditions for safe burning. Where prescribed fire is used in combination with thinning or other treatments, those treatments will be concluded before prescribed fire is applied. Some units may receive two underburn treatments if prescribed by the district fuels specialist to achieve the desired fuels condition, to maintain desired effects from a first burn, or to more closely mimic a normal fire return interval, which averages 6-17 years (Sugihara, 2006) in pine stands in the Harlan project area. Burning projects may be intermittently applied over a period of approximately 20 years after the signing of a Decision Notice, or until conditions change, at which point any outstanding work will be evaluated further under NEPA.

2. Thin From Below (including thinning or chipping of small material)

The intent of this treatment is to increase forest resilience to wildfire, insects, disease, and drought. Trees greater than 10 inches in diameter at breast height (DBH) will be thinned to 40 to 100 square feet per acre basal area[1] (averaging 60 square feet per acre basal area), leaving healthy co-dominant and dominant trees that are compatible with site conditions (i.e. ponderosa pine, incense cedar, Douglas-fir). In addition to thin from below, trees from three inches to 10 inches DBH will be thinned at a variable spacing of 15 to 25 feet (thin and chip). Leaving ponderosa pine and incense cedar will increase the percentage of desirable species in the understory. Up to 15 percent of each stand will be designated no-treatment (or leave) areas for stand diversity and hiding cover for wildlife. Untreated stands adjacent to the treatment units can

[1] Basal area is defined as the area within 1 acre that is occupied by the cross-section of tree trunks and stems at their base.

fulfill this percentage if they contain characteristics that should be retained. All thin from below treatments may include piling and burning of residual fuels, jackpot burning, or broadcast burning, as determined by the district fuels specialist. Mowing may be conducted as a preparatory treatment to allow for the safe and effective use of prescribed fire.

Stands 721-904 and 721-903 are located on productive forest soils, which have produced larger ponderosa pine than other units of similar age within the project area. These stands of larger pine will be thinned to a basal area of 80-120 square feet. The largest, healthiest trees will be cultured by removing all trees within a 30 foot radius of the stem. It is estimated that there will be approximately one large, cultured tree per acre on average. This treatment is intended to accelerate the development of large tree characteristics. Fuels treatments within these stands will be consistent with fuels treatments in other units proposed for the thin from below treatment.

Forest products may be one of the results of these treatments including sawlogs and biomass products.

The thinning treatment would likely be applied as part of a timber sale contract, and is estimated to be implemented within 10 years following a Decision Notice. Mowing and prescribed fire treatments will be applied after thinning during appropriate safe burning periods.

3. Plantation Thin

Stands designated for plantation thin are typically densely stocked with more small trees than the growing site can support. The intent of this treatment is to reduce the number of trees to healthy levels and is intended to increase stand resilience to wildfire, insects, and disease. Trees will be hand or mechanically thinned to a variable spacing of 15 to 25 feet by removing trees between three and 10 inches DBH. A wildlife biologist will identify those plantations that are located in high-use big game areas. These areas will be thinned at a reduced average spacing of 15 feet to leave more hiding cover.

Slash generated from this activity will be piled and burned, chipped, utilized for biomass, or left onsite to provide cover for wildlife. Understory brush mowing will be implemented in plantations where the existing understory condition is composed of mature, shade-repressed bitterbrush in order to stimulate new shoot development for use by deer and elk.

Where existing plantations are found to be sparsely vegetated, ponderosa pine or other site-adapted conifers will be planted to improve long-term stand development. Native grasses, plants, or shrubs will also be considered to promote better forage and wildlife habitat, and to reduce the competitive ability of invasive annual plants, where applicable.

Low-intensity ground fire will be introduced into plantation units after thinning if fuel conditions are conducive to safe broadcast burning. Site-specific burn plans will be written prior to using prescribed fire. Mowing may be needed to prepare a unit for the safe use of prescribed fire. These plans will incorporate specific fuel reduction and silvicultural objectives, as well as project design features to protect specific resources. Residual fuels may also be piled and burned.

Commercial products are not anticipated from this treatment but there may be firewood or biomass opportunities. Thinning activities will likely be completed within ten years following a Decision Notice. Mowing and the use of prescribed fire will be conducted following the thinning activity.

4. Juniper Reduction

Juniper reduction will remove juniper trees that have encroached into shrub-steppe or forest/shrub-steppe transitional habitats. Juniper reduction is intended to move treated areas towards the desired condition, which is a juniper population size and distribution of trees that is consistent with the historic settlement-era population and distribution. The historic settlement-era population size and distribution of trees can be inferred from the trend documented in aerial photos. The intent of this treatment is to return or mimic the beneficial effects of fire, provide firewood and biomass forest products for commercial and public use, and maintain and improve the variety and quality of big game and other wildlife habitat.

Treatments will include felling of juniper, and personal use and/or commercial use firewood gathering areas. Juniper felling will prioritize treatment of lands retaining healthy shrub-steppe vegetation communities with the intent of maintaining intact shrub-steppe habitats or values and halting the continued conversion of these vegetation communities to a juniper woodland.

Prescribed fire in the form of underburning, or hand-piling and burning will be considered in select juniper reduction stands in order to reduce activity fuels from felling and firewood gathering, or to reintroduce beneficial effects of fire.

After treatments, seeding or planting of site-adapted native grasses, plants, or shrubs will be considered to promote better forage and wildlife habitat, and to reduce the competitive ability of invasive annual plants.

Junipers greater than 24 inches DBH or trees designated as beneficial for wildlife will be excluded from this treatment.

These treatments may be applied incrementally, as funding and partnership opportunities allow. We anticipate that juniper reduction treatments may continue for approximately twenty years or until conditions change, at which point any outstanding work will be evaluated further under NEPA.

5. Commercial Juniper Biomass

Stands 720-115, 731-126, 731-128, 731-129, and 731-139 are anticipated to be ground-based commercial treatments in which juniper are harvested and processed as biomass. These stands are identified on project area maps. Prescribed fire in the form of underburning and/or hand-piling and burning may be applied following biomass removal in order to reduce activity fuels or reintroduce the beneficial effects of fire.

6. Strategic Fuel Breaks

With the Harlan Project, the Forest Service proposes to create strategic fuel breaks along major travel routes within the project area, including Highway 97. The intent of strategic fuel breaks placed adjacent to roads is to reduce the potential for crown fire by creating gaps in the forest canopy and reducing ladder fuels. Strategic fuel breaks will allow for safer ingress and egress for firefighters and safe escape routes for community members during wildfire, and more effective fire suppression during the event of a wildfire. These fuel breaks will serve as critical holding features in the event of a high intensity wildfire.

Treatment may include hand or mechanical felling and piling, pile burning, mowing or mastication, thin from below prescription, and broadcast or jackpot burning. Where mowing is conducted, mowing may take place every five to ten years in order to maintain the desired

condition. Site-adapted native grasses or forbs may be seeded or planted in fuel breaks in order to reduce the potential for establishment of non-native annual plants, to maintain a vegetation condition that minimizes hazardous fire behavior, and is conducive to safe fire suppression efforts. Any grasses or forbs used in fuel breaks will be reviewed and approved by district fuels specialist and district botanist to ensure that species selection is consistent with fuels and forest management objectives.

Site-specific burn plans will be written prior to the use of prescribed fire. These plans will incorporate specific fuel reduction objectives, as well as project design features to protect specific resources.

Actions Common to All Treatments and Stands

Retention

The project area will be evaluated for the need and potential to retain existing habitat in the form of untreated areas that will continue to serve as wildlife habitat during implementation and immediately following project disturbances. Retention areas may include no-treatment units, "clumps" of untreated habitat within treatment units, or a combination of the above, as appropriate. Any habitat retention strategy or design will be approved by the Forest Service wildlife biologist.

Management of water for wildlife and livestock

The Harlan project area will be evaluated to determine if there are opportunities to increase the availability of drinking water for use by wildlife, or the combined use of wildlife and livestock. Ensuring that adequate drinking water is available for wildlife will support the project purpose and need of improving forage for big game. We propose to repair (if needed) the existing well at Shafter campground and integrate it into existing and/or new pipelines to distribute water for wildlife and livestock. We propose to repair, maintain, and improve existing water developments used by wildlife and livestock, and we propose to add new water developments for wildlife, or the combined use by livestock and wildlife. New developments may include, but not be limited to troughs, tanks, ponds, pipelines, and guzzlers.

Management of Noxious Weeds

Noxious weeds will be managed in the project area. The use of herbicides to manage noxious weeds is not proposed by this project. Prior to, and following project disturbances, treatment areas will be evaluated for risk of infestation by cheatgrass and other non-native, invasive plant species. Permitted livestock may be used to focus grazing on areas at-risk from conversion to cheatgrass dominance, or in areas where cheatgrass is already dominant, with the intent of reducing cheatgrass populations and encouraging natural recovery of native perennial plants or seeding success. Controlled use of non-permitted livestock, including sheep or goats, may also be used to control cheatgrass or other non-native invasive plants or state-listed noxious weeds.

Access

Project Access

Access for this project will be through roads on the Forest Service Transportation System (system). Historic, existing, unauthorized roads outside of this system (temporary roads on existing roadbeds) may be used by the project in order to focus impacts where there is pre-existing disturbance, and reduce log skidding distances and associated impacts to soils and other resources. A total of 1.53 miles of new temporary roads will be constructed in order to implement the project. All roads needed for log truck or harvest equipment access will be cleared, graded, and maintained as necessary to allow log truck and equipment access. Temporary roads on existing roadbeds will generally be used as-is without further maintenance. Brush mowing may take place on temporary roads on existing roadbeds if they are to be used as fuel breaks in order to safely apply prescribed fire or to allow safe access for project implementation or firewood gathering at landings, following implementation. Firewood gathering at landings may be conducted under personal use or commercial firewood permits. All temporary roads and landings will be rehabilitated and closed after the project has concluded. If temporary roads or landings are to be used for public firewood gathering after other project activities, they will be rehabilitated and closed following that use, typically within five years after implementation of the other treatments. Currently, the public is allowed to drive up to 100 feet off open system roads in order to conduct firewood gathering under a Forest Service personal use firewood permit. We propose to allow improved public access to personal-use firewood within the juniper reduction treatment areas, as mapped. We propose to allow the public to utilize temporary roads on existing roadbeds in order to access juniper fuelwood. Vehicles will be permitted to travel up to 100 feet off of these roads in order to maintain consistency with normal district policy governing vehicle use for firewood gathering. Personal use firewood gathering is consistent with the restorative purpose and need for juniper reduction in these stands. We propose to identify firewood cutting areas, and stagger implementation of these areas through time in order to better enforce permit terms, improve ability to monitor resource conditions, and ensure that objectives are met before closing access to an area and opening a new one. We anticipate that improved access firewood gathering in the juniper reduction treatment areas may be an ongoing activity for up to twenty years, or until conditions change, at which point any outstanding work will be evaluated further under NEPA.

Road Repair and Management Outside of Treated Stands

The "Horsethief Creek" road (road 44N03Y) is currently in a state of disrepair and is a potential hazard to the recreating public. The road is not in a condition to allow pass-through travel where Horsethief Creek crosses the road and has returned to a bedrock stream channel. Repairing the road at this location to USFS standards will be cost-prohibitive and will not provide better access. This road is open to public travel and will be needed for future Forest Service management actions. We propose to downgrade the segment of the road at the stream crossing from a system Maintenance Level (ML) II road to a Level I[2] road or to remove that segment from the system. This will result in two "dead end" roads which approach Horsethief Creek from the north and from the south. The road will be blocked to traffic at the nearest vehicle turnaround to the closure at Horsethief Creek. By closing the road at an existing wide spot or turnaround,

[2] US Forest Service Transportation System Level I roads are not maintained for public use. Minimal maintenance may be implemented for administrative use, such as agency-prescribed land-management actions. Level II roads are maintained to a standard that would allow for public use. Most Level II roads on the Goosenest Ranger District are open to public travel.

recreationists can safely reach the end of the road and turn a vehicle around, and may have a better opportunity for dispersed camping. At the closure site, the road will be blocked with rocks, earthen berms, or a combination of these tools. Up to approximately 0.1 miles of the road will be downgraded or removed from the system. Public access will be improved on the Horsethief Creek road.

It was determined during district review, that one historic, existing, unauthorized road is needed for both the Harlan Project and for future management actions. This road will be analyzed for inclusion in the system as a Level I road.

The Orr Lake Nature Trail was used as a road (a portion of road 44N30X) prior to being blocked and closed to public travel in 2001 to protect cultural resources and nesting bald eagles. At that time, the road was signed as a foot trail and is still used by recreationists for that purpose. However, it is still documented in the system as a road. We propose to remove the Orr Lake Nature Trail from the system (of motor-vehicle routes), since it will not be needed for vehicle access at this time or in the future.

Lying immediately to the west and southwest of Orr Lake is Dead Steer Flat. Both adjacent to and in Dead Steer Flat are a small number of system roads which are currently not maintained, permanently closed to public travel to protect cultural resources, and not needed for future public or administrative access. Without these, Dead Steer Flat will still be accessible by functional system roads that are open to public travel. We propose to remove the identified roads at Dead Steer Flat (roads 44N46Y.A, 44N30X.A, and a portion of 44N30X) from the system.

Table 3. Summary of Proposed Road System Actions

Action	Length (miles)
New temporary road construction: To be used for life of project, then decommissioned.	1.53
Existing road change: Downgrade from Maintenance Level 2 to Level 1 or remove.	0.1
Existing road change: Closed road to be removed from system.	3.41

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Appendix A: Project Design Features

The Forest Service developed the following project design features (PDFs) to address overall project objectives, to minimize resource impacts, and ensure Forest Plan and legal compliance. These PDFs are in addition to Standards and Guidelines contained in the Klamath Forest Plan and approved Best Management Practices (BMPs). Table 3 below displays the PDFs developed for this project. PDFs are arranged in the table by resource: AIR = air quality, ARCH = archaeology, BOT = botany, FIRE = fire, NNIS = Non-native invasive species, RDS = roads, REC = recreation, RNG = range, SAFE = safety, SCEN = scenery, SILV = silviculture, WL = wildlife, and WS = watershed.

Design Feature	Description
AIR-1	Prescribed underburning and pile-burning will be conducted in accordance with an approved smoke management plan and an approved prescribed fire burn plan. These plans will address mitigations and requirements to minimize impacts of smoke. A smoke permit will be issued by the Siskiyou County Air Pollution Control District.
AIR-2	Commercial road use during the normal operating season will require dust abatement. Water or an approved alternative dust abatement compound will be applied as needed to decrease or eliminate dust generated from timber hauling on dirt roads.
ARCH-1	Activities with the potential to adversely affect historic properties are not allowed within the site boundaries, including buffer zones around sites. Examples of such activities include but are not limited to machine piling, mechanical mowing or mastication, underburning, and skidding.
ARCH-2	All landings, temporary road construction, and burn pile areas will be discussed with the district archaeologist prior to project implementation. If landings and burn piles need to be moved during implementation, the move will be discussed with district archaeologist.
ARCH-3	All historic properties will be clearly delineated prior to implementing any activities that have the potential to affect these sites. This includes, but is not limited to, flagging site boundaries.
ARCH-4	If any unrecorded historic properties or human remains are identified during project implementation, work in the immediate area will stop and the district archaeologist or the Heritage Program Manager will be contacted prior to continuation of work.
ARCH-5	If it is determined during the planning process that historic properties located within the area of potential effect cannot be avoided during project implementation, and the undertaking as proposed has the potential to effect historic properties either eligible or potentially eligible for inclusion in the National Register of Historic Places, then the Klamath National Forest will consult with the California State of Historic Preservation Office regarding the determination of effects for the proposed undertaking.
ARCH-6	Hazard trees within a historic property boundary may be hand-felled and removed by equipment confined to system roads. Hazard trees that cannot be removed by hand or by equipment operating on system roads will be felled and left in place on the site.
ARCH-7	If routine road maintenance activities such as blading, brushing, or resurfacing through a historic

Design Feature	Description
	property are necessary, these activities will be confined to previously disturbed surfaces such as ditches, culverts, rocked surface roads, and other clearly disturbed locations. Where road surfaces are native, blades will be lifted or non-archaeological materials, such as sterile fill, will be placed over the archaeological deposit to prevent surface and subsurface impacts. Ground-disturbing activities to create, maintain, close and/or stabilize temporary roads are NOT allowed within the boundaries of historic properties.
ARCH-8	Only non-mechanized hand treatments are to be employed to reduce hazardous fuels within at-risk historic property site boundaries. All hazardous fuels removed from within site boundaries utilizing such hand treatments will be transported off site and piled for burning outside of site boundaries under the direction of the district archaeologist or Heritage Program Manager.
ARCH-9	Linear historic features such as trails or railroad grades may be crossed by equipment at designated locations. The designated crossings will be selected by the district archaeologist or Heritage Program manager prior to the implementation of project activities and the location will be made known to the timber sale administrators.
BOT-1	In the event any threatened, endangered, sensitive, or survey and manage botanical species are discovered before or during the various phases of the project, a botanist will be consulted for appropriate protection measures.
BOT-2	Vehicles will not be permitted to drive in seasonally or perennially inundated meadow areas located off system roads.
FIRE-1	Trees will be whole-tree yarded (trees will be cut in the stand and then skidded to the landing where trees will be limbed , then slash and tops will be piled using a brush rake to remove non-burnable materials such as dirt and rocks). Top piles are intended to be removed within three years of being placed at the landing. Residual slash piles from operations will be burned after merchantable biomass/top piles are removed.
FIRE-2	In small tree thinning treatments, residual slashed piles will be located away from leave trees.
NNIS-1	Equipment, vehicles, and personnel will avoid working within flagged noxious weed sites. Orange /black flagging labeled with INVASIVE SPECIES will be used to delineate population boundaries
NNIS-2	Equipment or vehicles that may contain noxious weed seeds or plant parts will be cleaned of all dirt and debris prior to entering the project area.
NNIS-3	Any hay, straw, mulch, or seed used in the project area will be State of California certified weed-free.
NNIS-4	Any gravel, road mix, or boulders used in the project area will come from a weed free source and/or will be inspected by a qualified botanist for weeds prior to use.
NNIS-5	Before burning, a botanist or range management specialist will evaluate units to determine if they are at risk from the spread and establishment of cheatgrass and other non-native invasive annual plants. If the unit or area is determined to be at risk, the specialist may recommend site specific project design features which may include taking no action, shrub mowing or adjusted grazing as an alternative to fire, seeding and planting of competitive native plants, or adjustments to the burning schedule or techniques.

Design Feature	Description
NNIS-6	Soils that have been disturbed by projects may be seeded with site-adapted native plants where there is risk of increase of non-native invasive species and conditions are conducive for germination and establishment of seeded or planted species, as determined by a range specialist and/or botanist. Prepare soil for seeding, as needed, by lightly disturbing with harrows, disk, seed drill, or similar implements. Any areas considered for scarification will require review and approval by the district archaeologist.
RDS-1	All temporary roads used for entry will be closed immediately following implementation, unless left open for public firewood cutting in which case they will be closed immediately following that temporary use. When multiple entries are necessary for project completion, roads used by contractors will be closed in between each entry. Temporary roads will be hydrologically stabilized and closure will include all or a combination of the following activities: (1) placing boulders, earth, or log mound barriers to prevent vehicle traffic; (2) subsoiling and/or outsloping the road surface; (3) installing water bars and other drainage structures; (4) mulching with native materials (logging slash) or certified weed free straw; and (5) planting or seeding roadbed with site-adapted native plants as needed.
RDS-2	To make road closures more effective, no trees, other than hazard trees, will be removed within 50 feet of the intersection of any non-system road used for project access and a system road. An exception to this restriction will be the removal of trees to allow for equipment and vehicle access.
REC-1	A wetting agent will be applied as needed to decrease or eliminate dust generated from commercial hauling on roads near developed recreation sites.
REC-2	Commercial hauling through developed recreation sites will be avoided. Where avoidance is not possible, appropriate measures will be taken to protect public safety.
REC-3	Roads that lead to developed recreation sites which are used for commercial hauling will be appropriately signed to protect public safety.
RNG-1	Livestock use and impacts to mowed and/or burned areas will be monitored. If livestock use unacceptably hinders the recovery of native perennial plants or results in impacts to archaeology sites, livestock will be managed to minimize or eliminate negative impacts.
RNG-2	Timing of implementation actions will be coordinated as soon as feasible with the district range specialist. Permittees will be notified by the district range specialist prior to any implementation action which may disrupt livestock operations within their permitted allotment.
RNG-3	Projects will be monitored for establishment and spread of invasive annual plants after implementation. Distribution and timing of livestock grazing will be adjusted, if feasible and consistent with the terms of the established grazing permit, to manage populations of invasive annual plants and favor persistence and spread of competitive native plants.
SAFE-1	Hazardous trees or snags will be felled for safety, and removed if necessary along haul or access routes and in stands where project activities take place.

Design Feature	Description
SCEN-1	Where units are adjacent to denser forest, reduce the thinning percent within the transition zone toward the outside edge of the unit, in order to minimize line contrasts in foreground, middleground, and background distance zones.
SCEN-2	Create irregular vegetation structure densities (through the use of variable density thinning) in all units visible from roadways and trails to include retaining large lone trees, clumps of saplings, open forest understory, and irregularly-shaped openings.
SCEN-3	When and where applicable, maintain and enhance vegetation species diversity by retaining a mix of hardwoods, shrubs, and/or conifers.
SCEN-4	Where feasible, retain screening trees one tree height below roads and landings (including cable landings) when viewed from a lower position on the hillside. Avoid creating a straight edge of trees by saving tree clumps and single trees with varied spacing.
SCEN-5	Ensure slash is abated near landings by scattering, chipping, or other techniques that perpetuate a natural appearance.
SCEN-6	For all treatment units along Highway 97, and all other high and medium sensitivity roads in the project area, low-stump all designated marked trees to about 6", for a distance of 200' on all uphill slopes, and 100' on all downhill slopes. The sale administrator and landscape architect shall use professional judgement to vary the distance more or less to account for local variations in topography and amount of seen area post-harvest from the viewing area.
SCEN-7	Mask and/or remove all paint and flagging in units post-project along Highway 97, and all other high and medium sensitivity roads in the project area, and in or near any MVUM designated dispersed camps, including Orr Lake Campground.
SILV-1	Cut surfaces of stumps 14 inches in diameter and greater shall be treated with California registered borax fungicide to prevent the development of infection centers of the root disease *Heterobasidion annosum.*
WL-1	If a gray wolf den site is detected in or near the project area during the project implementation, a Limited Operating Period (LOP) that restricts above ambient noise- and smoke-generating activities within one mile of the den will be implemented from April 1 through June 30.
WL-2	While the provision for the gray wolf den site LOP is expected to provide protection from any prolonged or substantial project-related disturbance during the critical pup-rearing period at early rendezvous site(s), a similar LOP for activities within one mile of active rendezvous sites from April 1 through August 31 will be implemented. Further discussions and coordination with United States Fish and Wildlife Service (FWS) may result in modified distances or more flexible dates for this specific RPM.
WL-3	LOPs for wolves will be implemented unless there are topographic features or terrain that clearly separates the noise or smoke-generating activity from the den or rendezvous site(s).
WL-4	While there are no known wolf dens or rendezvous sites within one mile of the project area at this time, the LOPs specific to gray wolf will be included in the timber sale contract and would be put in place if denning wolves are detected. These measures will also be included in the burn plan and any other implementation contracts or plans.

Design Feature	Description
WL-5	Interagency coordination and close collaboration with FWS and California Department of Fish and Wildlife (CDFW) is an essential conservation measure for gray wolves. The Forest Service will continue to coordinate and communicate with FWS and CDFW on their monitoring efforts. If the Forest Service observes wolves, dens or rendezvous sites, it will be reported to the CDFW and the FWS so that follow-up investigation(s) can occur.
WL-6	Evidence of wolves around den and rendezvous sites are fairly obvious, given the tracks, prey carcasses and bones, scat, and visual observation(s) of a wolf or wolves. While these signs have not been observed in or near the project area to date, during activities and pre-decision planning and field work, surveys for other wildlife and implementation monitoring will be on-going and will continue throughout and after project implementation. Ongoing monitoring will likely include eagle and goshawk monitoring. Information from these surveys will be used to determine if LOPs are needed, if the determinations made in the project biological assessment are still applicable, or whether there is new information to be considered prior to continuing implementation.
WL-7	A seasonal restriction of March 1 to August 31 will apply to project activities that result in above ambient noise within 0.25 miles of an active northern goshawk nest. The same seasonal restriction will be applied to habitat modifying activities within 0.5 mile of an active northern goshawk nest. Additional seasonal restrictions may apply per survey results. Restriction may be lifted if goshawks are determined to be non-nesting in a given operating year.
WL-8	Existing skid trails may be used where they cross no treatment clumps, if needed during logging operations. Use of existing skid trails through no treatment clumps will be subject to approval by the district wildlife biologist.
WL-9	If a cave is discovered and deemed suitable for bats, a 250' buffer around cave will be flagged for no treatment.
WL-10	Juniper will be evaluated for retention in treatment units. Retention strategy will focus on retaining remnant trees from pre-settlement era, and trees the wildlife biologist designates as beneficial to big game or other wildlife species. These trees may be in areas where fire has been naturally excluded in the past. Juniper trees or clumps selected for retention will be approved by the wildlife biologist.
WL-11	Maintain coarse woody debris per direction and guidance found in the Forest Plan. Maintain 5 to 20 pieces of large down woody debris per acre where feasible. Where it is not feasible to leave 5 to 20 pieces of large down woody debris, use stand ecology as a guide for woody debris retention strategy. Retain all large diameter snags (greater than 20 inches DBH) unless felled for safety reasons. Snags felled for safety reasons, if any, will be retained on site to provide coarse woody debris, to be consistent with fuels objectives.
WL-12	Retain mature, wolfy juniper trees, recognized as those with some or all of the following characteristics: flattened, rounded or uneven tops; bark that is thick and fibrous with well-developed vertical furrows; trees having a combination of dead branches, missing bark and covered with light green lichens; and those trees with large branches near the base and weakened leader growth.
WL-13	Retain large pines used by eagles for winter roost. Protect large pines from piling and burning treatments.

Design Feature	Description
WL-14	Prescribed fire treatments in Forage and Winter Range Management areas will meet or maintain wildlife cover and forage requirements for big game species. Depending on location, big game habitat may be managed with an emphasis on habitat for antelope, mule deer, or elk. Prescriptions will utilize Habitat Capability Models of Appendix I of the Forest Plan (available as part of the project record on the project website).
WS-1	Pumping rate shall not exceed 350 gallons per minute or 10% of the morning flow.
WS-2	Pumping will be terminated when the water tank is full.
WS-3	Sites for water drafting for dust abatement will be designated by the Forest Service and agreed to by the purchaser.
WS-4	Water drafting will be from existing drafting sites and will be identified on the sale area map.
WS-5	Water trucks and pumping equipment will be in a well-maintained condition, free of fluid leaks and have hoses in good operating condition.
WS-6	Water trucks will be required to remain on existing rocked roads or approaches.
WS-7	Service landings where refueling and maintenance of project motorized equipment will occur will be at least 200' away from any channel. All fueling and lubricating actions and, in particular, fuel containment systems will be in place on landings as necessary.
WS-8	All boards and plastic will be removed after use for equipment refueling or servicing. Straw bales, rock surfacing, and containment dikes will be used at all locations where the possibility of water spill or overflow will result in sediment moving toward the creek.
WS-9	The Klamath Wet Weather Operation Standards (WWOS) (USDA Forest Service 2002) will be used to guide all project activities (harvest and hauling) during periods of wet weather. The timber sale administrator will examine field conditions to determine when the soil and roads have dried out enough, or frozen, to enable operations to resume without risk of watershed impacts. The project earth scientist may be called on to make recommendations to the timber sale administrator, who will provide direction to the contractor as to when operations may resume to ensure that BMPs will be met and adverse impacts will be avoided.
WS-10	All landing, temporary road, and skid road construction will be conducted during appropriate periods of weather and soil moisture to ensure BMP attainment and the avoidance of adverse impacts to listed species. Forecast periods will also be of a suitable length to allow completion or winterization of the task undertaken before precipitation events occur.
WS-11	Access to skid trails and temporary roads that intersect transportation system roads will be blocked with available material (either large wood or boulders) post-implementation.
WS-12	Improvements on the existing roads in the project area will not over-steepen the failed road cuts, will minimize sidecasting, and maintain the ditches and cross drains, and any outslope of the roadway.

Design Feature	Description
WS-13	Spot rocking will be used as necessary if small and isolated portions of the road system do not adequately dry to allow haul when most of the road is capable of haul, provided haul over the newly rocked areas will not create adverse impacts, such as sediment moving offsite towards channels.
WS-14	Existing landings will be used to the extent possible.
WS-15	Landings will be shaped to disperse drainage and direct runoff away from watercourses at the time of construction. Rock armoring and silt fences with straw bales may be used as necessary to direct water to areas of suitable drainage and to capture sediment. All new landing cut and fill slopes will be mulched and the mulch will be maintained throughout the life of the project. Landings will be shaped for drainage before the end of the operating season or at the completion of use.
WS-16	No more than 15% of a treatment stand will be disturbed by primary tractor skid trails and landings.
WS-17	Ground-based logging equipment will be restricted to slopes less than 35%. Slopes steeper than 35% that are located within tractor logging stands will be avoided or will be logged by end-lining from roads or skid trails.
WS-18	At project completion, permanent operating water bars will be installed and/or repaired as necessary on all skid trails according to Sale Administration Handbook guidelines, and slash scattered on skid trails if needed.
WS-19	No full bench skid trails will be constructed (full bench skid trails have the entire skid trail cut into the hill slope).
WS-20	Tractor skidding will be restricted to designated skid trails.
WS-21	The timber sale administrator will inspect erosion control measures for compliance with contract.
WS-22	Post-treatment total soil cover will range from 70-80% for machine-disturbed areas and 60-80% for underburned areas, depending on slope steepness. Soil cover standards will be met for each harvest stand before the fall rainy season (generally late October or early November).
WS-23	The existing amount of soil cover in untreated areas will be used as the guideline for treatment areas where existing soil cover is less than recommended levels
WS-24	Ground-based equipment will avoid the larger diameter logs as much as practical to protect existing course woody debris (CWD).
WS-25	Retain existing CWD whenever possible, providing the amount of logs meets fuel management objectives.